



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,796	11/24/2003	Siu Kwan Cheung	78319 P1676	5416
27975	7590	07/27/2004	EXAMINER	
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST P.A. 1401 CITRUS CENTER 255 SOUTH ORANGE AVENUE P.O. BOX 3791 ORLANDO, FL 32802-3791			DINH, JACK	
			ART UNIT	PAPER NUMBER
			2873	

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/720,796	<b>Applicant(s)</b> CHEUNG ET AL.	
	<b>Examiner</b> Jack Dinh	<b>Art Unit</b> 2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 April 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1103 and 0404</u> . | 6) <input checked="" type="checkbox"/> Other: <u>DETAILED ACTION</u> .                  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 discloses a configuration where the two elongated electrodes are coupled together at predetermined locations by a plurality of conducting bridges or capacitive bridges, shown in figure 4. Claim 10 discloses a configuration where the two elongated electrodes each have interdigitated members forming a large capacitor structure for providing capacitive coupling at high frequencies, as shown in figure 7. Claim 10 is a dependent of claim 6. However, the two configurations are independent. Therefore it is unclear how the two configurations can be combined simultaneously as claimed in claim 10.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2873.

2. Claims 1-5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over McBrien et al. (US 6,449,080).

(a) Regarding claim 1, McBrien (figure 5) is interpreted as disclosing a waveguide interferometric electro-optic modulator 170 comprising a first and second waveguides 104 and 104' formed in an electro-optic substrate 102 and a plurality of electrodes including an RF electrode 112 having a width  $W_{RF}$ , and a slotted ground electrode 111 including first and second elongate electrically-connected conductive portion 110 having widths  $W_F$  and  $W_S$ , respectively defining a slot 172 therebetween, wherein the first elongate conductive portion is disposed between the RF electrode and the second elongate conductive portion, wherein the RF electrode is positioned over the electro-optic substrate between the first and the second waveguides or at least partially over one of the first and second waveguides, and wherein the slotted ground electrode has an overall width substantially greater than the width of the RF electrode and dimensioned to reduce a piezoelectric voltage caused by thermal stress, thereby reducing a net phase shift and a resulting bias point sensitivity of the modulator to ambient temperature (col. 7, lines 34-48). McBrien is interpreted as disclosing all the claimed limitations except that  $W_F$  is at least 20% greater than  $W_{RF}$ . Although McBrien does not explicitly disclose this, McBrien discloses the teaching that the width of the electrode should be chosen so that the net phase shift caused by changes in the ambient temperature is significantly reduced. With this being said, the claimed dimensions that  $W_F$  is at least 20% greater than  $W_{RF}$  can be found by one with ordinary skill in the art through experimentation. It is consider not inventive to discover the optimum ranges by routine experimentation. Therefore, it

Art Unit: 2873

would have been obvious to one having ordinary skill in the art at the time that the invention was made to provide the claimed dimensions for the purpose of reducing the net phase shift caused by changes in the ambient temperature.

(b) Regarding claim 2, McBrien (figure 5) is interpreted as further disclosing that the first and second waveguides are coplanar, and wherein the slotted ground electrode is disposed over the other of the first and second waveguides or between the first and second waveguides, the slot for reducing strain accumulated across the width of the slotted ground electrode (col. 7, lines 61-65).

(c) Regarding claim 3, McBrien is interpreted as disclosing all the claimed limitations, as described above, except that the width of the first elongate portion of the slotted ground electrode is at least twice the width of the RF electrode along at least a substantial part of their lengths. Although McBrien does not explicitly disclose this, McBrien discloses the teaching that the width of the electrode should be chosen so that the net phase shift caused by changes in the ambient temperature is significantly reduced. With this being said, the claimed dimensions for the width of the electrodes can be found by one with ordinary skill in the art through experimentation. It is consider not inventive to discover the optimum ranges by routine experimentation. Therefore, it would have been obvious to one having ordinary skill in the art at the time that the invention was made to provide the claimed dimensions for the purpose of reducing the net phase shift caused by changes in the ambient temperature.

Art Unit: 2873

(d) Regarding claim 4, McBrien (figure 5) is interpreted as further disclosing that the slotted ground electrode is patterned on the electro-optic substrate.

(e) Regarding claim 5, McBrien (figure 5) is interpreted as further disclosing that the slotted ground electrode is formed of a first elongate electrode and a second elongate parallel electrode, wherein a plurality of conductive bridges electrically couple the first and second elongate portions (col. 7, lines 65-67 and col. 8, lines 1-4).

(f) Regarding claim 12, McBrien (figure 5) is interpreted as further disclosing a second ground electrode 174.

3. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over McBrien et al. (US 6,449,080) in view of the Applicant's submitted prior art.

(a) Regarding claim 6, McBrien (figure 5) is interpreted as disclosing a co-planar waveguide interferometric electro-optic modulator 170 comprising an X-cut lithium niobate electro-optic substrate 102, a first and second waveguide 104 and 104' that are formed in the X-cut lithium niobate electro-optic substrate, an elongate RF electrode 112 at least partially covering one of the first and second waveguides along its length, and a slotted electrode 111 formed by two elongate substantially-parallel electrodes 110, one of which is at least partially covering the other of the first and second waveguides (see drawing), and at least one electrode being substantially greater in width than the elongate RF electrode (col. 7, lines 46-48), wherein the two elongate substantially parallel

Art Unit: 2873

electrodes having a gap therebetween defining a slot 172. McBrien is interpreted as disclosing all the claimed limitations including the X-cut lithium niobate electro-optic substrate rather than the claimed Z-cut lithium niobate electro-optic substrate. Within the same field of endeavor, the Applicant's submitted prior art is interpreted as disclosing the teaching of an interferometer type modulator comprising a Z-cut lithium niobate electro-optic substrate. Therefore, it would have been obvious to one having ordinary skill in the art at the time that the invention was made to use the Z-cut lithium niobate electro-optic substrate because it requires a lower drive voltage than is generally required for the X-cut lithium niobate electro-optic substrate.

(b) Regarding claim 7, McBrien (figure 5) is interpreted as further disclosing that the two elongate electrodes are coupled together at predetermined locations by a plurality of conducting bridges (col. 7, lines 65-67 and col. 8, lines 1-4).

(c) Regarding claim 8, McBrien is interpreted as disclosing all the claimed limitations, as described above, except that one elongate electrode is at least twice as wide as the RF electrode along at least a substantial portion of its length. Although McBrien does not explicitly disclose this, McBrien discloses the teaching that the width of the electrode should be chosen so that the net phase shift caused by changes in the ambient temperature is significantly reduced. With this being said, the claimed dimensions for the width of the electrodes can be found by one with ordinary skill in the art through experimentation. It is consider not inventive to discover the optimum ranges by routine experimentation. Therefore, it would have been obvious to one having

Art Unit: 2873

ordinary skill in the art at the time that the invention was made to provide the claimed dimensions for the purpose of reducing the net phase shift caused by changes in the ambient temperature.

(d) Regarding claim 9, McBrien is interpreted as disclosing all the claimed limitations, as described above, except that the slot defined between the two elongate substantially parallel electrodes is less than a gap between the one elongate electrode and the RF electrode. Although McBrien does not explicitly disclose this, McBrien discloses the teaching that the slot reduces strain accumulated across the width of the ground electrode. With this being said, the claimed dimensions for the slot can be found by one with ordinary skill in the art through experimentation. It is consider not inventive to discover the optimum ranges by routine experimentation. Therefore, it would have been obvious to one having ordinary skill in the art at the time that the invention was made to provide the claimed dimensions for the purpose of reducing the strain accumulated across the width of the ground electrode.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over McBrien et al. (US 6,449,080) in view of the Applicant's submitted prior art as applied in claim 7, and further in view of Weldon (US Patent 4,039,982).

(a) Regarding claim 10, McBrien in view of the Applicant's submitted prior art is interpreted as disclosing all the claimed limitations, as described above, except that each of the electrodes have interdigitated members forming a large capacitor structure for



Art Unit: 2873

providing capacitive coupling at high frequencies. Within the same field of endeavor, Weldon (figure 5) is interpreted as disclosing the teaching of two electrodes 2 and 7 having interdigitated members 38 and 40 forming a large capacitor. Therefore, it would have been obvious to one having ordinary skill in the art at the time that the invention was made to provide interdigitated members on the electrodes for the purpose of providing capacitive coupling at high frequencies.

5. Claims 11, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over McBrien et al. (US 6,449,080) as applied in claim 2, and further in view of Weldon (US Patent 4,039,982).

(a) Regarding claim 11, McBrien is interpreted as disclosing all the claimed limitations, as described above, except that each of the electrodes have interdigitated members forming a large capacitor structure for providing capacitive coupling at high frequencies. Within the same field of endeavor, Weldon (figure 5) is interpreted as disclosing the teaching of two electrodes 2 and 7 having interdigitated members 38 and 40 forming a large capacitor. Therefore, it would have been obvious to one having ordinary skill in the art at the time that the invention was made to provide interdigitated members on the electrodes for the purpose of providing capacitive coupling at high frequencies.

(b) Regarding claim 13, McBrien (figure 8) is interpreted as further disclosing a second slotted ground electrode 174.

Art Unit: 2873

(c) Regarding claim 14, Weldon (figure 5) is interpreted as further disclosing that the interdigitated members are perpendicular to the electrode.


***Other Information/Remarks***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Dinh whose telephone number is 571-272-2327. The examiner can normally be reached on M-F (9:30 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y Epps can be reached on 571-272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jack Dinh

  
Scott J. Sugarman  
Primary Examiner